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31 January 1966

INTELLIGENCE MEMORANDUM

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SUBJECT: Effects of the Rolling Thunder Program and
North Vietnam's Reaction to the Bombing Pause

SUMMARY

Between 2 March and 24 December 1965 the Rolling Thunder Program carried out a total of over 24,000 sorties against military and economic targets in North Vietnam. The attacks against fixed economic targets in North Vietnam destroyed almost 17 percent of total petroleum storage capacity, over 27 percent of electric power generating capacity, and about 5 percent of railroad yard and port capacity. The air strikes have caused a gradual erosion of national capacity in specific military areas--ammunition depots, 34 per cent; barracks, 15 per cent; and supply depots, 9 per cent. Almost 1,200 pieces of transport equipment were destroyed and over 2,100 were damaged by the air attacks. In addition to these direct losses the air attacks have exacted an increasing toll in terms of higher costs and disruption of normal activity. Costly reconstruction efforts have required a widespread

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reallocation of manpower and a resulting decline in industrial performance. Problems in food destruction have become fairly common. The bombings have also forced the regime to accept losses resulting from its inability to maintain important export trades.

The North Vietnamese have taken advantage of the bombing pause to recoup from the effects of the Rolling Thunder Program. Two airfields in North Vietnam have been made operational for jet aircraft and additional airfield construction is underway. Air defense systems have been strengthened and for the first time a Chinese antiaircraft artillery battalion with heavy (85 mm) weapons may be going to North Vietnam. A substantial Soviet airlift of priority ^{Cargo} military _A was also started during the bombing pause. Substantial amounts of men, food, and supplies have been moved into the southern part of North Vietnam where they are stockpiled and held as reserves or moved forward into Laos and South Vietnam. The logistic network in Laos and North Vietnam has undergone extensive reconstruction or repair. Alternative highway routes and bypasses have been constructed, and inland waterways have been dredged in an attempt to make the logistic system less vulnerable to air attack. Truck traffic through Laos during the bombing pause was double the average level during 1965. The

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If the US air offensive were to include an attack on North Vietnam's bulk petroleum storage facilities the immediate economic effects would be felt principally in transportation. Substantial distribution problems would arise but they could be partially overcome in a relatively short time by using primitive means of transport or using stockpiles. The greatest impact of a sustained loss of petroleum facilities would be on military operations within North Vietnam. We estimate, however, that with Chinese cooperation which would require extensive trucking and costly emergency action, the problem of restoring petroleum supplies could be resolved after an initial period of adjustment. Petroleum imports could probably be restored to almost normal levels and almost certainly would be adequate to maintain essential military operations, particularly the logistic operations in support of the PAVN/VC forces in South Vietnam.

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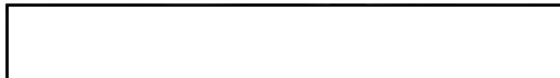
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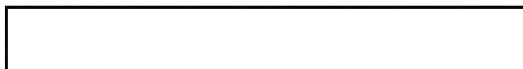


1. The Rolling Thunder Program

A. Objectives

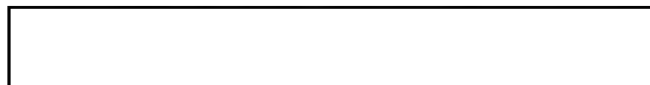
Between 2 March and 24 December 1965, the United States and South Vietnam conducted an air offensive against North Vietnam -- the Rolling Thunder Program. The objectives of this program were:

- a. to reduce the ability of or raise the cost to North Vietnam of infiltrating men and equipment into South Vietnam.
- b. to increase the political cost to North Vietnam of continuing to support Pathet Lao and Viet Cong activities in South Vietnam.
- c. to encourage the people and government of South Vietnam.



B. Physical Effects

Through 24 December 1965 the Rolling Thunder Program carried out 7700 strike sorties against fixed targets and almost 16,500 armed reconnaissance sorties. A tabulation of the physical damage resulting from the attacks on fixed targets is shown in Table 1. In addition to the damage caused by strikes against fixed targets, the armed reconnaissance missions included some attacks on fixed targets, but concentrated principally on attacks against antiaircraft sites, bridges and lines of communication (LOC). The armed



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Table 1Physical Damage Resulting From Rolling Thunder Program2 March - 24 December 1965

<u>Fixed Targets</u>	<u>Target Strikes</u>	<u>% of National Capacity Destroyed</u>
Barracks	44	14.6
Ammo Depots	13	34.2
FOL Storage	4	16.7
Supply Depots	18	9.4
Power Plants	6	27.5
Maritime Ports	4	5.7
RR Yards	1	5.2
Explosive Plant	1	71.0
Airfields	4	Runways cratered, 29% buildings destroyed at airfields attached
Naval Bases	2	45% buildings destroyed at bases attached
Bridges	42	39 not usable
Commo Installations	2	2 destroyed
Radar Sites	13	3 destroyed, 6 damaged, 4 redeployed prior to attack
Sam Sites	23	11 possibly damaged, 3 not observed, 1 destroyed
Locks and Dams	1	1 destroyed

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reconnaissance missions are credited with the following damage against transportation equipment:

<u>Type</u>	<u>Destroyed</u>	<u>Damaged</u>
Vessels (junks, etc.)	477	853
Vehicles	483	565
Railroad Stock	236	604

Although the economic and military losses caused by the US/GVN air strikes have been small in relation to total national activity, they have exacted a toll in terms of higher costs and disruption of normal activity. Reconstruction efforts have been hampered by difficulties in the allocation of manpower, managerial inefficiencies and a downturn in industrial performance in some sections of the economy. The regime has also had problems in the distribution of food particularly to relocated elements of the population and to the large increments of workers detailed to reconstruction and repair activities. These problems have not been insoluble and by the time of the bombing pause the disruptions to most normal economic activities had been minimized by the adoption of emergency measures to repair key transportation targets and the diversion of some import traffic from sea to rail shipment. The regime has been much less successful in coping with the sharp

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decreases in exports resulting from the bombing. The intersection of the Hanoi-Lao Cai rail line, for example, has resulted in a complete cessation of apatite export since early August 1965. The sharp increase in requirements for cement in military construction and in the repair of bomb-damaged structures resulted in decline in cement exports of 72 percent below the average level of exports prior to the Rolling Thunder Program.

The DRV attempted to offset much of the losses inflicted in specific military areas by abandoning facilities or engaging in the large scale dispersal of men and materials. Much of North Vietnam's ability to adjust to the US/GVN air strikes is a reflection of an increasing dependence on other Communist countries for material and technical assistance. Imports from Communist countries of military and economic assistance goods rose sharply in the last six months of 1965. The DRV also sought and obtained large amounts of technical assistance including teams of Soviet advisers for the repair of damaged electric power installations, advisers from North Korea on measures to protect North Vietnam's water supply and irrigation system, and approximately 25 - 35,000 Chinese railroad engineer and other support troops, to assist in the repair of strategic rail lines. The Chinese logistic and support troops are accompanied by security forces, including anti-aircraft units.

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C. Effect on Transportation and Infiltration

North Vietnam has had to move only small amounts of supplies -- 12 tons or less a day during most of 1965 -- over a well developed network of roads and trails which are relatively invulnerable to air attack. The US/GVN air attacks have, however, made logistic supply a considerably more difficult and costly process. Large amounts of manpower have been diverted from productive employment to repair and keep open the LOC's in South Vietnam and Laos. The DRV has, moreover, been compelled to use night-time operations only in the forward movement of men and supplies. A truck moving from Hanoi to points near the South Vietnam would ordinarily make the trip in about 4 days of day and night travel. When confined to night-time operations this same trip would require a minimum of 12 days.

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II. Activities in North Vietnam Since the Pause in the Bombing

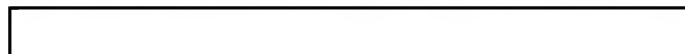
A. Airfields

During the bombing lull the North Vietnamese have been actively expanding their operational airfield system capable of handling jet aircraft. For the first time



jets have been noted flying in and out of Gia Lam Airfield near Hanoi and Kien An Airfield near Haiphong. Only two of the five bases capable of handling jets, Phuoc Yen and Kep, had previously been used operationally. The lack of a sufficient number of airfields capable of handling jet aircraft has long been a prime weakness in Hanoi's air defense system. Use of the new fields will extend DRV fighter time in the air significantly, particularly with respect to meeting attacks coming in from the sea in the Hanoi-Haiphong area.

At Dien Bien Phu airfield photography indicates that the North Vietnamese are extending the length of the runway from approximately 4,000 feet to 6,000 feet, probably to accommodate jet fighters. Such use of the field would extend significantly the range of DRV fighters operating against US planes coming in over North Vietnam from the direction of Thailand.



the North Vietnamese have been flying a large number of round-robin transport flights to Dien Bien Phu. Many of these flights have apparently involved the airdropping of supplies, possibly for the



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laborers or the garrison at the field.

In mid-January low level photography indicated the probable first stages in the construction of an airfield with a 6,600 foot runway on the outskirts of Yen Bai. When this airfield is ready to handle jets, it will fill in a gap between Dien Bien Phu and the Hanoi area, and will enhance the ability of the North Vietnamese to intercept aircraft attacking from Laos.

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B. Air Defense

[REDACTED] continued efforts during the bombing pause to strengthen the North Vietnamese air defense system, with assistance from the Soviet Union and China. The most dramatic development has been the increasingly aggressive effort by the North Vietnamese and Chinese against high-altitude reconnaissance aircraft operating over North Vietnam. During the bombing lull, a total of five reconnaissance drones were flown over the area. All were shot down either by surface-to-air missiles or by MIG jet aircraft flown from Chinese or North Vietnamese bases. This increased aggressiveness presumably reflects a Communist desire to conceal military developments that have taken place since the stand-down in US air attacks. Another indicator of new developments in the North Vietnamese air defense structure is the fact that since 23 December at least 8 Soviet AN-12 heavy transports have been noted

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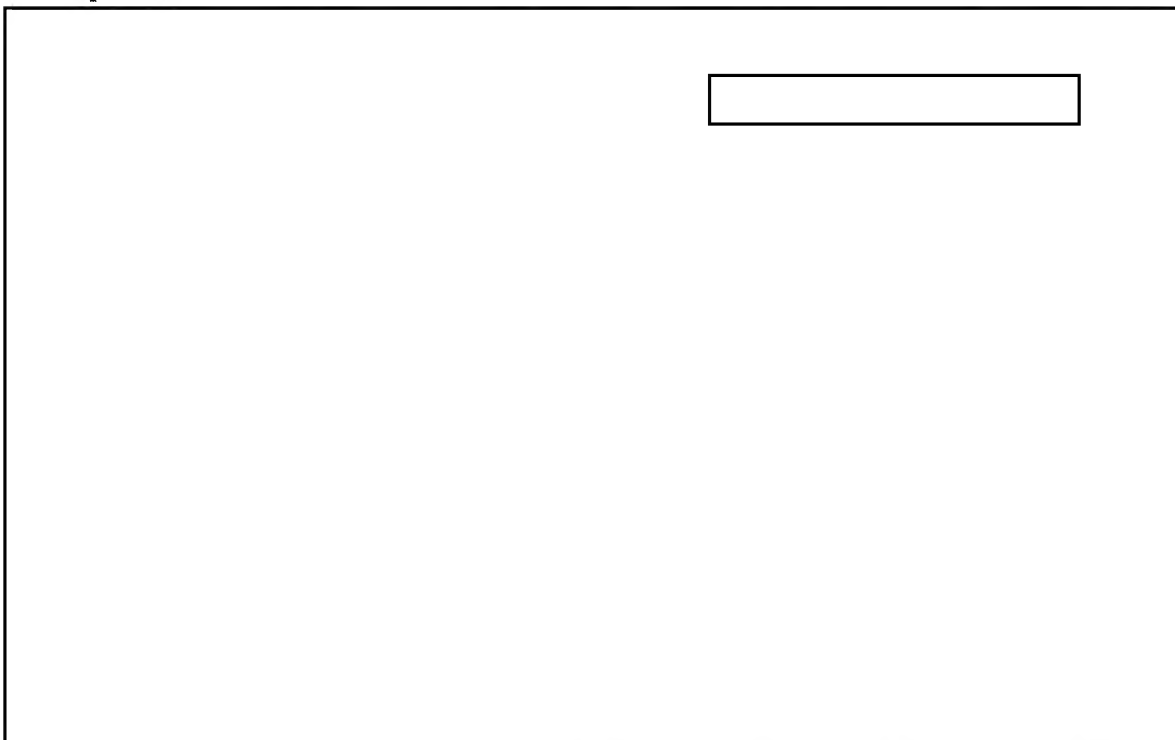
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flying into North Vietnam. Each of these aircraft is capable of carrying about 10 tons of cargo on such a flight. The nature of the cargo actually carried is unknown, but the fact that it has been sent all the way from the USSR by air suggests that it is priority military equipment, probably related to North Vietnam's air defense system.



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C. Reconstruction of Transportation Facilities in North Vietnam

The North Vietnamese have used the bombing lull to repair lines of communication, and to prepare themselves for new attacks. They have had the time and outside assistance to organize transportation

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and repair activities more adequately and to establish alternate means of transportation. They have been building new roads and river crossings, so that they will have alternate routes when and if the primary roads are again interdicted by air strikes. Aerial photographs show that bridges are being rebuilt and reinforced and that emergency bridges and ferries or fords are being installed at some key points. [REDACTED] Many of these fords will be difficult to block by air strikes. Numerous items of road construction equipment such as scrapers, excavators, tractors, and bulldozers, as well as structural steels and prefabricated shapes for bridge, repair and reconstruction, have been received from the USSR. During December Soviet assistance to the damaged North Vietnamese railroad system included a shipment of several thousand tons of rails and rail joints.

D. Chinese Troops and Construction Assistance

Prior to the bombing lull the Chinese had assigned elements of two railroad engineer divisions to North Vietnam to help keep transportation lines open. [REDACTED]

[REDACTED] in early January, another Chinese Communist military construction unit moved into northwest North Vietnam from Communist China. Extensive construction activity has been detected

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in areas where these Chinese engineer units are known to be operating. Total Chinese Communist troop strength in North Vietnam is now estimated at 25,000 to 35,000 men.

E. Build-up of Supplies in the Southern Provinces of North Vietnam

The North Vietnamese have taken full advantage of the cessation of bombing to increase the flow of supplies to the southern provinces of North Vietnam, Laos, and South Vietnam.

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Aerial photography confirmed truck convoys moving during day light hours on route 15, which leads to Mu Gia pass, and the infiltration corridor in Laos to South Vietnam. Since 24 December more than 200 trucks have been photographed in the roads in southern North Vietnam - most of them on route 15.

[REDACTED]

The air strikes had almost eliminated truck movements during daylight hours in this area.

Increased use of the inland waterways to move both economic and military traffic was observed in the latter part of 1965 and this development continued during January. In some cases the inland waterways have been used to supplement the highways and in other cases as alternates when certain sections of highways were closed

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because of bomb damage. A number of small dredges have been imported and increased dredging of waterways has been taking place since the start of the low water season.

F. Protection of Dams and Dikes

While little is known of contingency plans for the repair of dams should they be attacked, a group of North Koreans reportedly is in North Vietnam advising on water control. The North Vietnamese apparently are taking at least rudimentary measures to protect key locations against flood waters. Truckloads of iron mesh squares, said to be used as a foundation for dikes to protect against flooding, have frequently been seen in Hanoi.

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III. Activities in Laos

The bombing pause has not spared targets in Laos from continued air attack. Throughout 1965, truck traffic continued to increase as the capacity of routes was expanded. Through truck traffic is now possible, in dry weather, from Mu Gia Pass on route 12 at the Laos/North Vietnam border, to the Laotian border provinces adjacent to South Vietnam. The possibility of interdicting the supply routes in Laos is made much more difficult with the addition of the alternate routes now available to the North Vietnamese. The foot trail around the end of the Demilitarized Zone, a known personnel infiltration route, has more elaborate improvements with many new narrow bridges over streams and hand rails along its steeper grades.

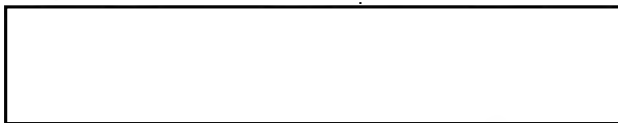
Since the bombing pause, reports of road watch teams show increased movements of traffic on the Laotian routes. The team located on route 911, a newly completed north-south road from the Mu Gia pass area, has seen more than 600 trucks moving south past its vantage point since 27 December. The parallel old road, route 23, is apparently carrying somewhat less traffic than it did a year ago. In combination, however, these two roads are carrying more than twice the southbound traffic that was observed during the dry season from December to May a year ago. At that time the average southbound movement was 17 trucks a day, whereas this year, the two roadwatch

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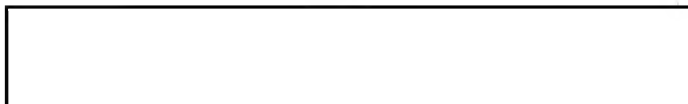


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teams have reported an average of 30 trucks a day moving south on the two roads since 27 December, when the team covering new route 911 first got into position.

 there are elements of at least one, and perhaps two North Vietnamese regiments working in the area of the Mu Gia pass. This is a good indication of the importance which Hanoi places on keeping the Laotian routes open and operating. These units have engaged in road repair activities, and have also built by-pass roads around critical choke points. In some areas double by-passes have been constructed.



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IV. Activities in South Vietnam

The continuing heavy movement of trucks south through North Vietnam and Laos makes it appear highly probable that North Vietnam has been at least maintaining the pace of its infiltration of military personnel ever since the bombing ceased.

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All these activities indicate that Hanoi has continued to infiltrate regular troops since the bombing lull, although it may be months before enough evidence is available to sort out the exact movements and the size of the infiltrating elements.

As Communist forces in South Vietnam have increased rapidly during the past year, their tactical headquarters have also been enlarged in both scope and number in order to coordinate the numerous units of regimental strength. There are indications of at least four so-called "battlefront headquarters". These are commands capable of controlling division-level operations, by three or more regiments.

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quarters are mobile, and are capable of either detaching regiments or battalions for independent operations or of absorbing new units as

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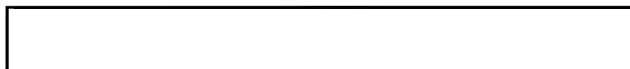
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circumstances may require. Although these "battlefront" headquarters have not yet operated in combat at the full level of their operational capabilities, reports of major enemy actions in 1965 revealed several instances in which elements of two or three Communist regiments operated in conjunction. Thus, it now seems reasonably clear that the Communist forces in South Vietnam have the potential capability to operate at the division level.

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V. Effects of a Resumption of Bombing

A. Effects on the Hanoi Regime

A resumption of the bombing will serve notice that the US having had its peace moves rejected by the Hanoi regime is determined to get on with the war. Although Hanoi may react to the resumption of bombing in its usual tough and unyielding position several factors may work to create additional pressures on the regime. Since the DRV used the bombing pause to build-up and strengthen its logistic network a revived Rolling Thunder Program will have to expand a considerably greater effort to reduce the flow of supplies to Laos and South Vietnam. Under these conditions logistic supply would become more difficult and costly. This could over a sustained period of time subject the Hanoi regime to mounting pressures in attempting to maintain its logistic capabilities. The resumption of air attacks could in a period of time, particularly if coupled with increasing losses in the South cause the populace to be less willing to support the regime in its conduct of the war.

B. Effects of Bombing Petroleum Storage Facilities

North Vietnam depends upon imports for all of its supplies of petroleum, and its bulk storage facilities



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had a combined pre-attack capacity of about 214,000 tons. Of this total, Rolling Thunder strikes eliminated about 37,000 tons of capacity, or 17 percent. The surviving tankerage has the capacity to hold about one year's requirements of about 175,000 tons.

At present, nine major storage terminals contain 168,000 tons of bulk storage capacity. An additional 9,200 tons of storage capacity is widely dispersed. Successful air attack would eliminate the principal petroleum storage facilities and would preclude the delivery of petroleum supplies in bulk by tankers.

The loss of petroleum storage facilities--and their contents--would have an immediate effect on the economy. The major effect would be on transportation. Civilian motorized transportation would come to a quick halt. The transport of food, raw materials, and finished goods would be curtailed drastically. Some relief would be found by using primitive means of transport or through use of existing stockpiles.

Precise data on stockpiles of petroleum in North Vietnam, including that in drums and small buried tanks, are not available. The inventory represented by these expedients and by untargeted facilities is

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small, totaling only about 10,000 tons--less than a month's supply at current supply rates.

A sustained loss of petroleum storage facilities coupled with an inability to import even minimum operating requirements would have its greatest effect on military operations. North Vietnamese military forces account for about 60 percent of total petroleum consumption, or a monthly average of about 8,500 tons. North Vietnam with Chinese cooperation would probably be able to maintain petroleum imports, however, at almost normal levels. The supply of essential imports of petroleum for military requirements would appear to be almost certain.

In a reasonable period of time, the North Vietnamese with the help of China could organize some emergency supply of petroleum. Given sufficient time and additional expense and effort the total amount of petroleum normally consumed by North Vietnam--some 15,000 tons a month--could be delivered at Fort Bayard in China and moved by rail to P'ing-hsiang. Assuming that trucks could make the round trip from P'ing-hsiang to Hanoi in four days in spite of interdiction, about 800

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trucks could probably handle this volume. Even on a worst-case basis the regime could meet its most essential requirement for petroleum--that needed to maintain the logistic pipeline to South Vietnam. At the end of 1965 the North Vietnam forces in Military Region IV (MR IV) (including the four southern provinces of North Vietnam) were estimated to have been consuming petroleum at a rate of roughly 1,500 short tons a month. This petroleum supports three major activities: (a) the maintenance of lines of communication and transport facilities within MR IV and loading from North Vietnam to Laos, (b) the operations associated with the use of MR IV as a military staging area, and (c) the actual movement of men and supplies into Laos and South Vietnam.

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